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PHILIPPINE GEOGRAPHICAL SOCIETY

Soil Conservation Building, Florida St.
Manila, Philippines

PHILIPPINE GEOGRAPHICAL JOURNAL

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Soil Conservation Building, Florida St.
Manila, Philippines

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THE AUTHORS

Alden Cutshall, one of the charter members of the PGS, is again in the Philippines as Fulbright Professor of Geography at the University of the Philippines. Dr. Cutshall, on leave from the Chicago Division of the University of Illinois, was here in 1950-51 on a Fulbright research grant. Previous publications in the PGJ include "Trinidad Valley: Middle Latitude Agriculture in the Philippines" (Vol. 1, 1953) and "Western New Guinea: A Study in Political Geography (Vol. II, Nos. 1 & 2, 1954). Other of Dr. Cutshall's publications in the Philippines have appeared in the *Journal of Geography*, *Economic Geography*, *Economic Botany*, and *Scientific Monthly*. He is the author of the chapter on the Philippines in *World Political Geography* (Crowell), 1948; and has authored both the chapter on the Philippines and the one on Indonesia and Malaya in the 1957 revision of this popular text.

Alejandro R. Apacible is an agricultural chemist and sugarcane technologist whose interest in sugar research lies on increasing production of cane per unit area thru the use of modern methods in sugarcane husbandry. Returning to Manila after his study trip in continental U. S. A. and Hawaii last year, he submitted a comprehensive report of his observations abroad.

He graduated from the University of the Philippines in Agriculture, 1934, spent his years as plantation manager, planters chemist and agronomist, refinery control chemist aiding in the development of the sugar industry. Today he is with the Philippine Sugar Institute, formerly as agronomist and presently as secretary-treasurer.

He has published several technical studies aside from other works which he coauthored with other Filipino scientists and technologists.

Aside from being a member of several local and international scientific societies, he also is a member of the Rotary Club of Cavite, District 385, the Knights of Columbus and Rizal Center, Academic Brotherhood, Los Baños Chapter, U. P.

He was President of the Philippine Society of Agricultural Engineers (1955-56) and chairman of the Special Study Committee on Prices of Farm Machineries and Equipment, Presidential Study Committee to Promote Farm Mechanization and Improve Facilities for Farmers, Office of the President, Malacañang, Manila.

Professor A. P. Aglibut is presently Research Associate Professor of Agricultural Engineering at the University of the Philippines, College of Agriculture in Los Baños, Laguna. He obtained his Bachelor's degree from the University of California and his Master's degree in Agricultural Engineering from the Iowa State College of Agriculture and Mechanic Arts. He is one of the country's top agricultural engineers and authority on farm buildings and irrigation. Prof. Aglibut is an active member of several scientific societies and most of his research work on irrigation have been published in several scientific journals.

Leonardo Mariano, Jr. and **Raoul Ursua** are presently connected with the Irrigation Service Unit, Department of Public Works and Communications as Field Supervisor and Assistant Field Supervisor respectively assigned in District No. 7, Bicol Provinces.

Leonardo Mariano graduated from the National University in 1952 with the degree of Bachelor of Science in Mechanical Engineering, while Raoul Ursua obtained his Bachelor's degree in Agricultural Engineering from the Araneta Institute of Agriculture in 1955. Mr. Mariano is an active member of scientific societies in the Philippines such as the Soil Science Society of the Philippines, the Philippine Geographical Society and the Philippine Society of Agricultural Engineers.

Both are credited for the successful implementation of the NEC-ICA Pump Irrigation Program in the Bicol area as evidenced by the now existing twenty-two (22) ISU pump projects efficiently and smoothly operated by the recipient farmers' associations.

OBITUARY

Robert Larimore Pendleton
1890-1957

The Soil Science Society of the Philippines in particular and the equatorial countries in general, has suffered the loss of one of the world-renowned scientists by the death of Dr. Robert Larimore Pendleton in June, 1957 at the age of 67.

Born in Minneapolis, Minnesota on June 25, 1880, Dr. Pendleton finished his high school in Campbell, California in 1910 and attended the College of Agriculture in the University of California in Berkeley, California where he obtained the degree of Bachelor of Science in 1914. In 1917, he finished his post-graduate work in the same university with a doctorate in Soil Chemistry.

As his first assignment in the Philippines, Dr. Pendleton served the U. P. College of Agriculture as Professor of Soils in 1923-1930 and Head, Department of Soils in 1930-1935, a position held until he became Soil Technologist and Agriculturist in the Royal Department of Agriculture and Fisheries in the Siamese government up to 1942. Dr. Pendleton was responsible for the creation of the Department of Soils in the College of Agriculture, University of the Philippines, and the awakening of Soil Consciousness in the country.

Dr. Pendleton has written several scientific papers about Philippine soils both in the Philippines and abroad, and mostly published in the *Philippine Agriculturist and Philippine Sugar News*. Among his noted survey works were the soil classification of the Silay-Sarabia Area in 1925 and the La Carlota Sugar District in 1930, both in the province of Negros Occidental and survey of soils around the Maquiling area. He has, to his credit, trained Filipino soils men many of whom now have responsible positions in the field of soil science in and out of the Philippine government.

Dr. Pendleton was Soil Technologist of the Ministry of Agriculture, Bankhen, Bangkok, Thailand at the time of his death and member of several honor societies among which are the American Geographical Society, American Chemical Society, Soil Science Society of America, American Association for the Advancement of Science, Association of American Geographers, American Geophysical Union, the Siam Society, Sigma Xi, Alpha Zeta, and the Soil Science Society of the Philippines.

—A. Barrera

DUMAGUETE: AN URBAN STUDY OF A PHILIPPINE COMMUNITY [1]

ALDEN CUTSHALL
University of Illinois, Chicago

Dumaguete is the capital, principal port, educational center and the largest urban settlement of Negros Oriental. It is a chartered city and a trading center for a large but somewhat indefinite hinterland that exports abaca and copra. [2] Commercially and strategically, it commands the southern entrance to Tañon Strait between Cebu and Negros.

PHYSICAL SETTING

The most southerly town of any size in southern Visayas, Dumaguete is situated on the southeast coast of Negros, seven miles south of the southern tip of Cebu. It lies almost directly opposite the small island of Siquijor and upon one of the larger of the small, isolated and discontinuous segments of coastal plain that fringe eastern and southern Negros. The urban site has a seawall and a narrow beach of firm coral sand on its seaward margin and the Banica river at its southern boundary. The terrain near the river is so low that *nipa* prevails, though the elevation rises slowly toward the north and west. This flat coastal strip, at most only a mile or so in width, merges into a significantly hilly area, really the dissected pediment of the adjacent Southern Highlands. This southeast portion of the Southern Highlands is the Cuernos de Negros (Horns of Negros) Group, a rugged, forested volcanic cluster of peaks culminating in the twin Cuernos de Negros with crater lakes and an elevation of 6,245 feet.

Climatically, Dumaguete has a short though not completely dry season in March and April (the driest month) and a moderate amount of rainfall irregularly distributed through the remaining months. With an annual precipitation of 55 inches, it is one of the dryer stations in the Philippines and has only 100 to 150 rainy days per year. The temperature is high throughout the year and the annual range is less than 5 degrees, no distinct seasonal variation. Within 16 degrees of the equator, the season migration of the sun's vertical rays has little effect. The percentage of daytime cloudiness is of more significance and temperatures vary inversely with cloudiness.

The violent typhoons which cross those parts of northern Philippines have never caused severe damage in Dumaguete. Less severe disturbances or one of the more distant typhoons may affect the area, however, and has caused heavy rain on occasion.

The Dumaguete hinterland is essentially an agricultural area. Probably the only exceptions are the manganese mining on Siquijor, sugar, alcohol and paper at Bais, and the purely local manufacturing in or near Dumaguete (pottery at Sibulan, rice and corn mills, muscovado sugar and bolos).

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[1] This is one of the several studies made by the author during his sabbatical year in the Philippines. Field research upon which this paper is based was made possible by grants from the United States Educational Foundation in the Philippines (Fulbright Program) and the University of Illinois Research Board.

[2] Sugar from the Bais Central is shipped from the company's own pier, but in all other respects, Bais is within the Dumaguete hinterland.

Lowland or coastal plain soils, except where sandy, are clay or clay-loams, poorly drained, slow-drying and sticky when wet. These soils do not cover a large area and are normally planted with sugar cane, (as at Bais) or, in rare instances, with rice. On the bordering slopes, the soil is better drained and is most often planted with corn or coconuts. (Figure 1). This is best exemplified by the large coconut plantations, with copra dryers and other machinery, at Pamplona and Polo north of Dumaguete. Smaller coconut groves utilize those small tracts of sandy soil that line the shore. On the steeper slopes, the soils are well-drained clays and clay-loams, but are thinner, locally stony, oftentimes with bedrock at the surface. These are corn lands in most cases and are illustrative of severe soil erosion in many instances. At Valencia, (Lazuriaga) partly because of a slightly cooler climate (elevation 750-800 feet), there is a minor vegetable industry for the Dumaguete market. Abaca is oftentimes the cash crop in the hills, particularly on the steeper slopes. A large part of the nearby mountain area is covered with rain forest.

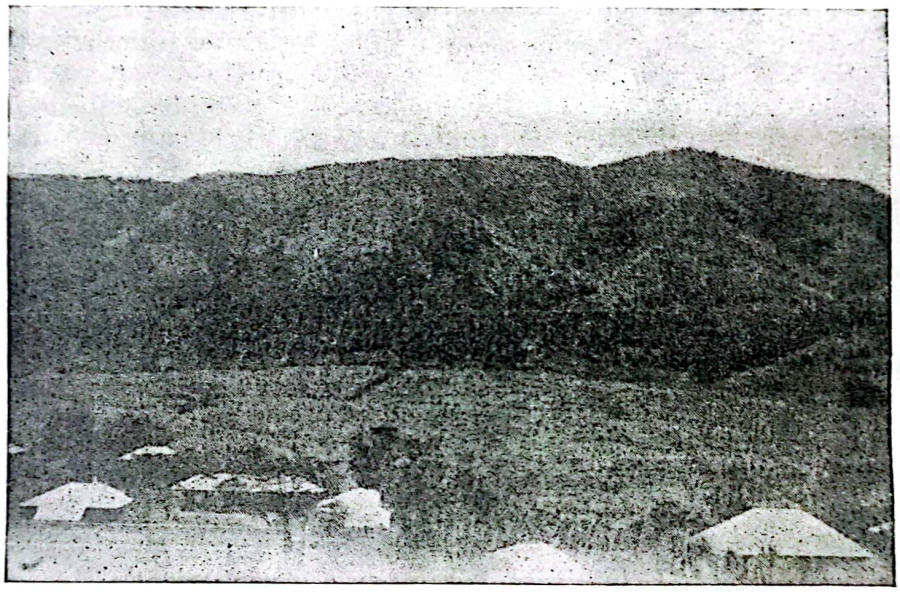

FIGURE 1. *Terrain conditions at Bais. Along most of eastern Negros the coastal plain is narrow, oftentimes discontinuous. The lowlands are planted to rice or sugar cane. The lower hills are corn or coconut lands. The highlands are rainforest areas or cogon grass uplands. In this photo one can note sugar cane on the plain, coconut-covered hills in the middleground and grassy hills or low mountains in the background.*

TRANSPORTATION AND COMMUNICATION

Interisland craft and some ocean vessels load and discharge cargo at the Dumaguete municipal pier, a concrete structure 250-300 feet long.

Along the coast is the provincial highway paved between Dumaguete and Bais, but elsewhere, a rough but all-weather road surfaced with coralline sand and shell fragments or crushed coralline limestone. To the north, this road extends to the northern end of the island and on

to western Negros. To the south, it ends at Tolong on the southern coast about 50 miles from Dumaguete. Other roads extend from Dumaguete to the inland settlements of Valencia and Palinpinon, both five miles away.

The Dumaguete airfield, on the highway just north of the town, has a smooth, grassy runway. It is a regular stop on the Cebu-Dumaguete-Dipolog-Zamboanga-Jolo route and on the Cebu-Dumaguete-Ozamis-Cagayan de Oro route.

There is radio, telephone and telegraph and postal service with other principal cities and towns.

THE URBAN PATTERN

The central feature of the town is the plaza about 200 yards from both the shore and the river. Most of the built-up area of the town is included within an area about one-half mile, by three-fourths mile, bordered on the east by the sea and on the south by the river. (Figure 2) In this fairly compact region, the streets are roughly parallel to the coast and river, intersecting approximately at right angles. A newer section of the town extends to the northeast, with streets at a slight angle to those of the older area. The newest district is directly related to the fact that both the Capitol and Silliman University are at the northern edge of town. The principal streets, in most cases the north-south streets, are paved with Macadam and are in good condition. The lesser streets are graded earthen roads, or lanes, most of them with a surface of coralline sand or gravel.

The principal retail area is between the Catholic church and Silliman University, but there is no truly compact business area. It follows the usual Philippine pattern of interspersed business structures and residences, most often a common building with the living quarters above or behind the commercial room or rooms. Modern warehouses or other commercial storage facilities are totally lacking. The better residences are along Calle Rizal paralleling the sea or are on the grounds of, or near Silliman University.

A large part of the industry is home or family enterprise and may or may not be within the political boundaries of Dumaguete. The "bolo" factory, slaughter house and a rice and corn mill are in the south part of town, but another rice and corn mill and the muscovado sugar mill are along the highway south of the river. The pottery area (10-12 home establishments) is at Sibulan, a smaller nearby settlement north of the airfield and is based upon a local clay obtained at the edge of the community. (Figure 3) However, the major industries of the region, the sugar and related industries at Bais, the copra ovens at Pamplona, Pool and elesewhere, and the saw-mill at Montenegro, reflect the bulkiness and possible perishable nature of the raw materials as localizing factors.

FIGURE 3. *Pottery is a local home industry in Sibulan and northern Dumaguete City. Thhe local clay is moulded, and air-dryed then fired in backyard open pits using local wood as fuel. The resulting products, shown here, are then stacked along the highway for sale.*

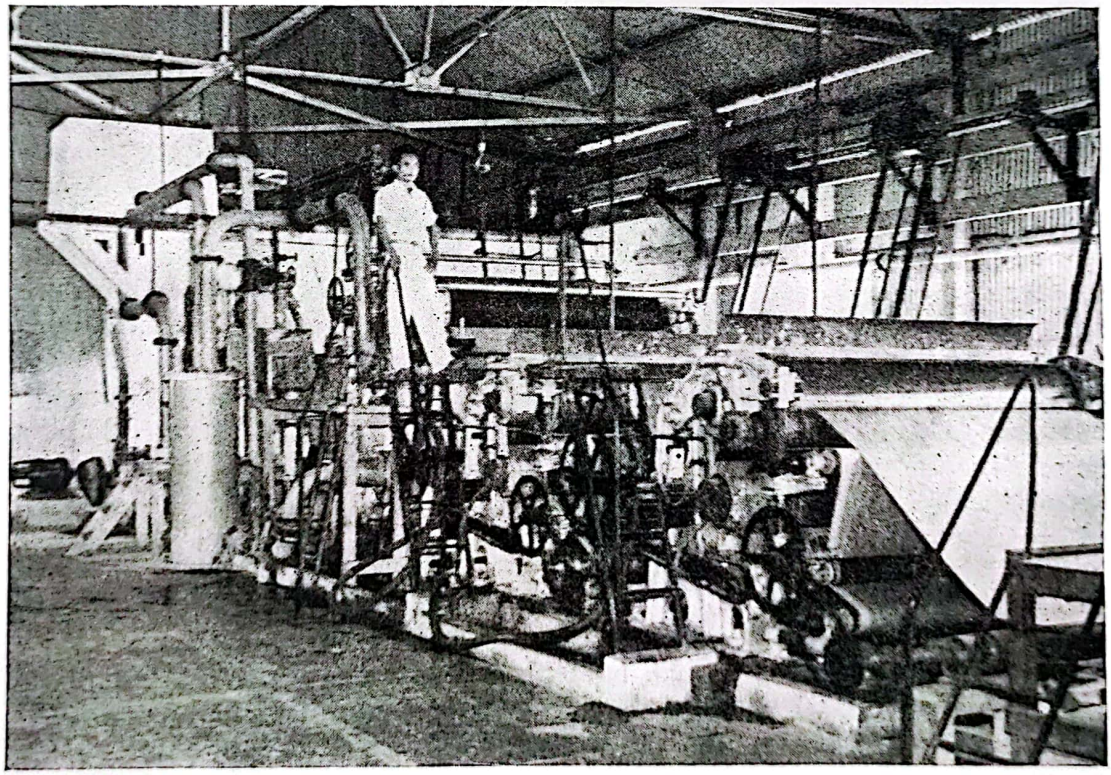

FIGURE 4. *Modern cylinder machine for the manufacture of clipboard paper at Bais. The Bais interests have pioneered in the use of bagasse as a raw material for paper manufacture and operate the only commercial paper mill in the Philippines. (Photo, courtesy of Bais Industries)*

THE SILLIMAN INFLUENCE

Silliman University, a Presbyterian college and hospital, has had a marked effect upon the community. The faculty is composed of both Americans and Filipinos. They are well-trained and capable leaders. Their opinions are respected in the community. They have set a good example in behavior, of course, in home construction, in sanitation, and along many other lines. The university has the best equipped and probably the best staffed liberal arts college in the country and the hospital is one of the two good hospitals outside of Manila. Unlike missionaries in some other disciplines, the Silliman people have not confined their interests to Christianity and closely related aspects of the culture. Their presence has been felt, at least indirectly, in many ways and in all parts of Dumaguete and the countryside.

CONCLUSION

The Spaniards founded Dumaguete in 1534. From this settlement they built many churches which became, and still are, focal points of village life in western and southern Negros. In the modern Philippines, Dumaguete is a provincial capital, but is also a regional center of the first magnitude.

In general, Dumaguete does not differ markly from other coastal communities of comparable size and political influence. Legaspi and Laoag in Luzon, Roxas in northern Panay, Tacloban in Leyte and Cagayan de Oro in northern Mindanao are representative illustrations of other settlements of moderate size and comparable facilities. All of them are secondary ports and regional commercial centers of significance, each is a provincial capital with roads, water and air connections. All of them have one or more local colleges, although not all of them have mission colleges. All of them have an economy that is cast upon an agricultural base, although none of them lie upon a large plain that is truly a major agricultural area.

Dumaguete differs from this pattern and the many other communities of like physical, economic and political environment in that its strategic position gives it regional influence and greater commercial importance. It is more of a "cross-roads" community. Secondly, it is a more healthful community and has a somewhat richer cultural life in comparison with the above-mentioned communities. These facts certainly reflect the Silliman influence, although other historical factors and certain physical factors (a driest climate and better drainage) cannot be ignored.

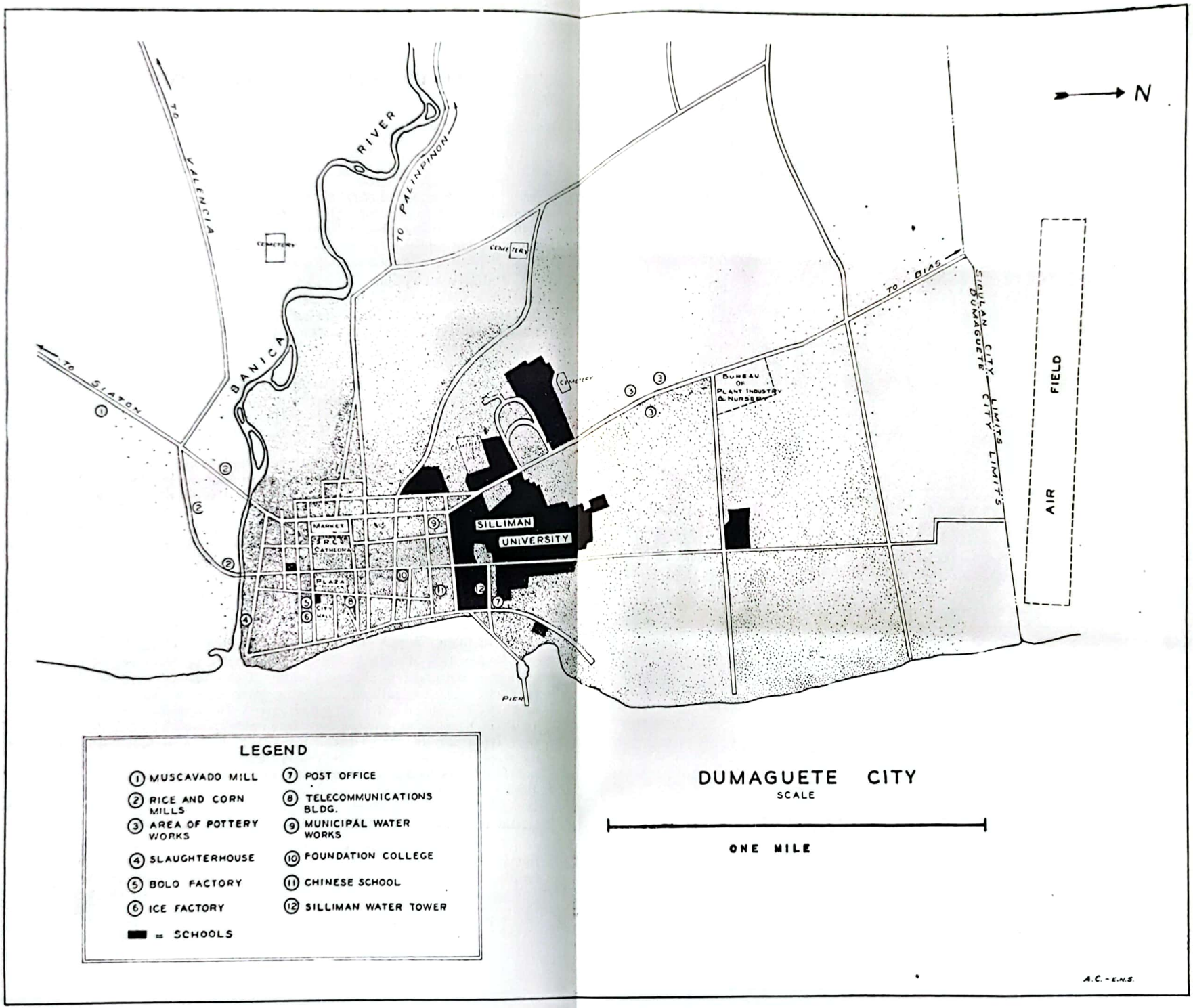

Figure. 2. Map of Dumaguete area. The degree of shading approximates the density of population within Dumaguete City.

SUGAR'S ROLE IN PHILIPPINE INDUSTRY *

ALEJANDRO R. APACIBLE **
Secretary-Treasurer
Philippine Sugar Institute

Government Policies: The accomplishments to date and the prospects of our sugar industry have vindicated the faith and efforts of our producers and have amply justified the established policies of our government regarding that industry. Our sugar producers with the encouragement and support of the government have thus helped substantially to bolster our economic and social objectives.

Unlike other industries which suffer from lack of organization and concerted action for self-improvement, the sugar industry has deservedly earned the distinction of being a well coordinated and research-conscious industry. It has remained a potent and progressive industry, because the producers and the technologists engaged in sugar production are men of vision and action.

Sugar, One of Safest Investments Among Our Agricultural Crops: The sugar industry has established itself as one of the safest fields of investment in agriculture, manufacturing and trade as is evidenced by the amount of money put into it by both governmental and private banking and credit institutions in the Philippines. Taking the government interests alone, the Philippine National Bank which supplies the bulk of the credit requirements of sugarcane producers, has extended loans to the industry averaging more than ₱100.00 millions for the past years (1951 to 1954 inclusive), while the Rehabilitation Finance Corporation's financial aids to the industry have totalled ₱85.379 millions (from January 2, 1947, when it started operations, to September 30, 1955), of which ₱23.332 millions represent loans to sugarcane farms and ₱62.047 millions for the rehabilitation and modernization of 17 sugar centrals. The total loans and capital of about ₱230.00 millions for the production of 1953-54 crop, the largest after the war, constituted almost 34 percent of the money in circulation (₱676.6 millions) and 18.75 percent of the total money supply (₱1,226.6 millions) on January 1, 1955.

Sugar As a Weaith Producer: Computed on the basis of actual and estimated data, the total money value of the 1954-55 crop would amount to about ₱271.200 millions. It thus produced in that year alone that much additional wealth, of which about 76 percent constituted dollars ($103.500 millions) earned for the country, thereby enabling it to import from abroad our essential needs for the maintenance and improvement of our living standards and reduction of our living costs. Our export earnings of ₱215.327 millions from sugar and related products in 1955 constituted 25.85 percent of our total domestic exports. Remove them from our commerce and our unfavorable balance of trade that year would have been ₱454.883 millions instead of ₱239.556 millions.

Employment Capacity: While in our development plans for our economy, the objective of increasing productivity and income, rather than employment directly, should be paramount, the number of people gainfully employed in and benefited by our sugar industry is nevertheless

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* Paper read during the PHILAAS day; Science Week, Nov. 19-24, 1956.
** Secretary and Fellow, Philippine Association for the Advancement of Science.

significant. According to recent studies made, about 265,400 persons are directly engaged in and benefited by the industry, and allowing four dependents for each would bring the total to 1,327,00 persons as being directly dependent for their livelihood on the industry. There are 17 provinces whose combined population in 1954 was about 10 million, producing sugarcane for our 25 centrifugal mills. Some of these provinces, like Negros Occidental, Pampanga, Tarlac, Batangas, Iloilo, Laguna, Pangasinan, Negros Oriental, etc. heavily depend on sugar for the support of their local governments as well as for the maintenance and betterment of the economic and social well being of their inhabitants. Placing those who are indirectly benefited by the industry even at only 10 percent of their combined population, the number would reach one million persons. Adding these to 1,327,000 persons directly dependent on the industry for livelihood would bring the total to almost 2.5 million persons.

Payroll and Bonus: A noteworthy aspect of the management-labor cooperation in the sugar industry is the large ratio of total annual payroll and bonus received by the employees and laborers in relation to the money value of sugar procured. Based on actual data covering the 1951-52/1952-53 crops of ten centrals, these show that their aggregate payroll of ₱12,139,892 constituted 28.26 percent of the aggregate value of sugar received by them totalling ₱43,307,799; if the total bonus of ₱694,715 were added, the ratio would be increased to 29.87 percent. The payroll and bonus ratios to the aggregate value of sugar received by them in the 10 centrals' records under review ranged between a high 52.50 percent, followed by 44.66 percent and a low of 11.61 percent. The combined production in 1953-54 and 1954-55 has increased over that in 1951-52 and 1952-53 by 27 percent. As a rise in wages goes hand in hand with a rise in production, it would seem reasonable to place the total annual payroll for the past two crop years, computed at 30 percent of the value of the 1954-55 crop of ₱271.200 millions, at a minimum of ₱81.360 million in the production end alone of the industry. This does not include the money value of the many privileges and amenities received by employees and laborers in sugar centrals, such as free house or quarters, water, light, fuel, health, educational and recreational facilities, etc.

Investment in Capital Assets, Etc.: Based on the actual investments of ₱149.771 million in capital assets and supplies put in by 12 centrals up to the crop year 1951-52 or 1952-53, it required those centrals an average investment of from ₱13.00 to ₱29.00 per picul to produce their aggregate crop during the period under review. Applying this ratio to the 1953-54 crop, the total investments in sugar centrals alone would amount to about ₱390.00 million. The total investment, including those in sugar lands with quotas, improvements and facilities and farm implements needed in the production of cane, as well as those in the marketing and distribution of sugar, were estimated at about ₱1,350.00 million.

Manila Railroad Company's Freight Loading: The government-owned Manila Railroad Company's gross receipts of ₱6.873 million for freight handled in 1954 totalling 1,161,198 metric tons were derived substantially from sugar and related products. Of this tonnage, 570,-089 tonnes or 49.00 percent represented freight car loading of sugar and

related products. Freight revenue from these sources computed at only 40 percent of the gross receipts would amount to about ₱3.550 millions in 1954.

Consuming and Buying Capacities: Our sugar industry is essential not only for its productivity but also for its role as stabilizer of our economy because so many allied businesses heavily depend on it for their profitable operations. In the production of cane and manufacture of sugar, the sugar industry needs and buys machineries, equipment, locomotives and cane cars, trucks, tractors and other farm implements, fertilizers, fuel oil and lubricants, drugs and chemicals, rubber products, jute bags, lime and many other supplies and materials. Thus, sugar helps keep the wheels of allied industries and businesses turning almost the year round.

Markets for Philippine Sugar: Our close and unique relationship with the United States has guaranteed for the Philippines under the Philippine Trade Revision Act of 1955 (Laurel-Langley Agreement) from 1956 to 1974 a minimum annual share of 952,000 short tons commercial weight for the United States market. The Philippine quota under this Act has been fixed at 980,000 tons, raw value. While the Philippines receives no participation in the increases in U. S. sugar consumption from this year up to 1960, President Eisenhower upon signing the new sugar extension bill made the following statements:

"..... *I believe that when new amendments are being prepared at the conclusion of the present Act, consideration should be given to allowing the Philippines to share in the increased consumption as is now provided for other foreign countries by the Bill.*"

Our 1956 basic quota of 25,000 metric tons for the world free market under the International Sugar Agreement has been augmented with a reserve quota of 20,000 metric tons, plus 3,890 tons as our share of the deficiencies of other exporting countries.

U. S. and World Sugar Prices: We are a direct beneficiary of the U. S. sugar quota system, and share in the benefits of a stable and government-supported market to implement the primary objective of the U. S. Sugar Act of 1948, as amended, namely the stabilization of the domestic sugar-producing, refining and importing industries. The United States sugar market is the largest and offers the best price in the world. "During normal times, the operation of the U. S. sugar quota system tends to stabilize prices in the United States market at levels much in excess of those prevailing in the world market. This has been achieved during the past four years, the excess averaging yearly, on the basis of F.A.S. Cubas, as follows: ₱4.29 per picul in 1952, ₱6.27 in 1953, ₱5.66 in 1954, and ₱5.02 in 1955. The latest (August 20) quotations for 1956 showed an excess of ₱4.99 per picul of New York over world prices."

Research in the Sugar Industry: Research has made the sugar industry a highly competitive enterprise, which has compelled our sugar producers to organize and coordinate their efforts to achieve efficient and economic production. This is done by (1) increasing production per unit area (2) utilization of sugar and its by-products to some kind of consumers goods (3) increase per capita consumption in the Philippines. Believing this goal attainable only through a sugar research

institution of their own, they succeeded in having a law enacted creating the Philippine Sugar Institute, exclusively financed by the sugar producers, precisely for the purpose of helping producers improve and lower their cost of cane production in the field and sugar manufacture in the factory. Sugar producers have voluntarily taxed themselves in the extent of ten centavos per picul for the past five years, because they believe their hope for growth lies in scientific research and improvements. Technological advances and discoveries in sugar agronomy, technology, by-products and marketing are taking place day by day, and our sugar producers must therefore keep abreast and take advantage of those improvements, lest they lose in the race for survival in a competitive world market.

The age of sucrochemistry has been ushered in by the Sugar Research Foundation, Inc., of New York City, of which the Philippine sugar industry is a sustaining member, recently when it perfected after having researched for three years a new process in the manufacture of synthetic detergents, using sugar and coconut oil as raw materials. Our sugar producers recognize the great potentialities of this new enterprise and appreciate the need for continued promotion and protection of our sugar industry so that it will be prepared to participate in and profit from the development of this new industry. According to Dr. Hass, "marked progress has been made this year in the adaptation of the sugar ester detergents process for pilot plant operation. The normal difficulties in expanding the scale of a chemical process were experienced. The reaction can be carried out successfully on any desired scale and within the near future, plants can be designed with guaranteed production capacity." In the United States alone, a large market for synthetic detergents exists, whose value is estimated at about half a billion dollars annually.

Of our agricultural crops like copra and coconut products, sugar, abaca, minerals, logs and lumber which occupy our foreign trade, sugar has increased tremendously. The wholesale destruction of production facilities and industrial plant during World War II, the increased volume of industrial production from some 21 per cent (1937 as based) in 1946 to 120 per cent, in 1951 showed some remarkable progress. It gave an actual increase of 470 per cent from 1946 to 1951.

Coming back to sugar in spite of handicaps that beset the other industries we have produced a sizable quantity. Starting after the war (1945-46) 5 mills from Luzon produced 12,000 short tons and the industry keep on that in the crop year 1953-54 our production not only filled our domestic quota of 350,000 short tons but also for our 950,000 tons for U. S. quota and 75,000 short tons for world market. We were able to fill these requirements during the last three years, and therefore we were able to supply the sugar needed for our local and trade agreements, not only that, but we have excess production. In 1934 we produced more than 1.5 million tons of sugar. In 1935 we have to burn and cut some sugarcane. You can see then how the sugar industry tried to work spending time and money to regain the prominence it had occupied in our national income. We had 45 mills before the war while now we have 25 mills and still produced as much as before. Our big problem is to sell the excess sugar or use it as a basic material for other kinds of consumer's goods.

I mentioned to you the possibilities and encouraging results in detergents using sugar and coconut oil as raw materials, then we have our excess bagasse in some big sugar mill that can be used as material for producing pulp for part of our paper requirements, we have our molasses for the production of alcohol, yeast and aconitic acid to mention only a few. Experimental results on use of sugar for non-food products are encouraging. What is left to us therefore is to dominate the scope of specialized research, for where there is technical problem there is solution that can be formulated. One thing I notjced is that to some of us who may be considered successful in some undertaking and yet cannot push thru his ideas which simply means lack of public relations and the ability to sell his services, especially so because our group has little or no contact with the public.

With the present advancement of science a new concept in our ways of doing things should be accurately tailored to the requirements of the sugar industry and the equipment we have for a particular research. The sugar industry is gifted in the sense that our agricultural research has kept its technical men informed not only on our local research but also make use of results obtained in other countries with corresponding modifications to suit our local conditions. Our technologists has strived to keep the standards of men working elsewhere, and given the time, opportunity and confidence of our capitalist, you can be assured that they will deliver you the goods. Every year the sugar technologists used to gather in convention, to exchange ideas, experience and knowledge for the benefit of all. This gathering serves as a means of communication that today contributes mightily to the basic human need for food.

Through intensified research of the by-products and raw material of chemistry, a better way of life could be enjoyed not only for the Philippines but also for the entire world. Now you will find in literature and other publications that bagasse could be utilized in the manufacture of paper, cardboard, insulating material, furfural, chemicals and a variety of products for non-food uses. From the molasses we can get protein production by yeast, aconitic acid and cattle feed; from the press cake we have waxes and fertilizer materials and myriad developments that sucrochemistry has instored for the future. As the technology of the sugar grow more complex we have one consolation that we have them in abundance both for our use as food and for export as a dollar earner and for research that is universal in application and understanding.

Other chemicals have recently come into use in sugarcane agriculture for effective weed control, insect pest and diseases. Now that our cost of production is increasing because of high cost of labor, the use of chemical is resorted to for economic productions. We have the 2, 4-D (2, 4-dichlorophenoxy acitic Acid) (Pre-emegent); TCA, CMU, Dalapon (Sod. salt of 2, 2 dicloropropionic acid) for weed control and for insect we have BHC; Parathion or Malathion (toxic to human) and the popular DDT; all these are considerably new in our country that trials are undertaken both by College of Agriculture Philsugin and private mill laboratories.

New added hope in our research is the use of radioactive carbon (C14) for photosynthesis in plants; Radioactive phosphorus (P32) for study of phosphate fertilizer uptake; Radioactive cobalt (Co 60) for measuring soil moisture in the soil and help in the measurement on ripening of sugarcane by drying off; and Rubidium (Rb 86) for tracing irrigation water, it can be used also as a tracer for potassium. I mentioned these findings so that when the nuclear reactor is established in the Philippines someone at least from this group can help harness the atom for the benefit of humanity.

To me I think that a gathering like we have today is a good vehicle to convey forward what little progress we have undertaken. This convention is an opportunity for a sober appraisal of our work and development.

It will thus be seen that besides the sugar producers and other actually engaged in sugar production and marketing, the government and people as well have a big stake in our sugar industry. The policies of the government in helping the sugar industry to stand securely on its feet are not purely paternal and altruistic, for our government derives reciprocally substantial profits and taxes from that industry.

Judging by the performance and accomplishments of our sugar industry it can well serve as a model for organization and research consciousness for other industries to emulate. The government project seeking to appropriate about ₱5 millions each year for research in the Philippines has been signed by President Ramon Magsaysay. It is hoped that this project will prove to be a big boon to Philippine agriculture and industry, including rice and corn, coconut, sugar, tobacco, abaca, etc. Sugar, more than any other industry in the Philippines, can lead the way in the pursuit and enhancement of scientific research for the advancement and improvement of these industries.

"The sugar industry also dramatizes one crucial problem which technological development and research alone are not capable of eliminating. While the sugar industry is admittedly a leader in industry research in this country, it is at present undergoing a time of troubles due not so much to the inadequacy of know-how or the lack of will to increase productivity but because of defects in the economic organization of the industry. The atmosphere in which these defects can be eliminated is nothing more than that in which economic progress has always thrived in democratic countries. The sugar industry stands as a dynamic example of the peaks of accomplishment which private enterprise can attain in this country in cooperation with the government. It is hoped with confidence that in a climate of greater free enterprise, the sugar industry will master also the problems of economic organization."

Our sugar men and technologists, despite the many vexing problems besetting the industry, notably its relatively high cost of production, should be happy in the knowledge that they have contributed their share towards bolstering and improving the economic and social health and security of our country. Incidentally, our sugar men with their traditional pioneering spirit, venture capital and technical know-how, have led in the opening and establishment of new and promising industries, thus helping in large measure to widen employment opportunities for our labor force and increase their productivity and income. "And it leads, out of self-interest, into a net gain for the nation."

LITERATURE CITED

1. Anonymous (1955) The Philippine National Bank
2. " (1955) Rehabilitation Finance Corporation
3. " (1955) Central Bank of the Philippines (Statistical Bulletin, Dec. 1955)
4. Anonymous (1955) Bureau of Commerce and Industry (Market Division)
5. Anonymous (1953) Handbook of the Sugar Industry (May 1953) Sugar News Press
6. Anonymous (1955) Manila Railroad
7. " (1955) Philippine Trade Act (Revision) or the Laurel-Langley Agreement
8. " (1954) Sugar Research Foundation Inc. Report
9. " (1956) Sugar News Editorials (Sugar News Press)
10. " (1955) Report Experiment Station, Hawaiian Sugar Planters' Association
11. Anonymous (1956) Chemical Engineering (April 1956) p. 126
12. " (1956) Sugar Research Foundation Report (May 3, 1956)
13. Anunciacion, Casiano — Our Common Stake In Sugar — Sugar News, Vol. 32, No. 2, (February 1956)
14. Oliveros, Salvador B. (1956) Speech Before the Philippine Society of Mechanical Engineers' Second National Convention (Sept. 22, 1956)
15. Raxas, Sixto K. Personal Conservation
16. Samuels, G. H. Gibes and L. F. Martorell (1956) — Increased Use of Agricultural Chemicals in Puerto Rico. Sugar (October) pp. 38-42
17. Torres, Jose C. (1956) — Power and Industry, 3:3 pp. 12-15

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NOTES ON METHODS OF RICE PRODUCTION IN JAVA

ANDRES P. AGLIBUT [1]

(First of a series of articles by the author on methods of rice production in foreign countries visited by him in his recent travel sponsored by the Rockefeller Foundation).

The following notes on the methods of producing rice in Java were obtained through conferences with Mr. H. Siregar, Chief of the Rice Research Institute, and Mr. Van der Goor, Chief of the Agronomy Division, both branches of the General Agricultural Experiment Station, Bogor, Indonesia; from observations at the said Institute, at the Muara Experiment Station and field trips through the rice producing areas of West Java; and from reading some references on the subject. In Java there are approximately 3,441,300 hectares under rice production. Of this hectarage about 85 per cent is planted in irrigated and rain-fed lowlands and the rest in rain-fed uplands. Approximately 20 per cent of the irrigated lowlands is under gravity irrigation systems, which were expertly developed by Dutch engineers long before World War II; another 20 per cent by simpler gravity systems; and the rest with rain water collected in earth reservoirs or tanks and fields provided with comparatively higher levees to hold the rain water.

In the irrigated areas two rice crops a year are generally grown from the same field. The first crop, usually late maturing varieties, is grown from July through December; and the second, usually early maturing varieties, from late January and February, through May and June. But owing to the favorable and even distribution of rainfall in West Java, rice is planted and harvested in any month of the year, with more than 65 per cent of the crop harvested in April, May, and June.

Plains and rolling grounds, and hillsides and valleys are equally utilized for rice growing in Java. Paddies or plots therefore vary in size, the bigger ones averaging about one-seventh of a hectare on flat grounds, and the smaller and narrower ones, about one-half of the above, on rolling and sloping topography. Structures similar to our beautiful Bontoc terraces on the hillsides are laid out along the contour; and because of the well-developed and effective network of irrigation system, water is utilized progressively from the highest to the lowest paddies or terraces which are held by dikes that are kept beautifully in trim and strongly firm to hold the soil and ponded water. Wherever possible and practicable, run-off from hillsides and mountain slopes that accumulate in streams and ravines is diverted by means of simple communal diversion dams. Water is thereby often diverted at several points from both sides of streams, depending on the volume of low topography and area under cultivation. Permanent, bigger and more expensive concrete diversion dams for more extensive gravity irrigation are constructed across bigger channels and rivers by the national government.

Land Preparation

The Indonesian farmer normally and thoroughly prepares his land for his next crop of either rice or upland crop, such as sweet potato, cassava, gabi, corn or soybean. He generally prepares his land for rice un-

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der wetland conditions. To do this, he depends much on animal and/or human power. Water buffaloes or oxen are his chief sources of animal power. A team of two cattle, harnessed to an iron or wooden plow, is commonly used for plowing the previously water-soaked field. Smaller paddies or plots are tilled by the farmers with hoes. This is a good instance which shows the industry and diligence of the Indonesian farmer. For normal land preparation under favorable condition, a field to be planted to rice is plowed or hoed, submerged for one week, harrowed, submerged again for one week, replowed, submerged the third time for another week, and finally harrowed or raked to level and puddled preparatory to transplanting.

Under extremely unfavorable conditions caused by lack of work animals and unfavorable weather, land preparation is often performed hurriedly, resulting in poor yield. One plowing followed by one harrowing with a week of soaking in-between, or in extreme cases, one plowing followed immediately by harrowing is practiced. This does not render the soil in as good condition of tilth and free from weeds as in the normal operation, which fits it for optimum condition.

Transplanting

Almost all of the rice planted in irrigated fields in Java are transplanted. The seedlings are raised in seedbeds or nurseries near the farm homes for easier care and better protection. For optimum results the age of seedlings at transplanting ranges from 28-30 days for early, 35-37 days for medium-, and 40-42 days for late-maturing varieties. Rice is transplanted in hills, three to five seedlings to a hill, and in rows straight in one direction, 25 centimeters apart for sub-japonica and 30 centimeters for indica varieties. Distances between hills in the row are as close as possible to the above respective varietal spacing. Guide strings and other means are used at transplanting to get straight rows. Farmers, as well as farm women, share in transplanting, but without an accompanying music, which is almost an essential part of transplanting rice in the Philippines.

Weeding

Weeding is a very important field operation practiced by the Java rice farmer. His desire to eliminate weeds in his field is reflected in his thorough land preparation and in giving sufficient time between plowing and harrowing to enable the rotting and incorporation of the decayed weeds with the soil. Especially at the early stages of growth of the rice crop does he practice thorough weeding. The first weeding is performed at the first drainage, usually one month after transplanting. Subsequent weedings, two or three times more, generally result in an almost weed-free field.

Irrigation

All wetland rice fields planted to rice in Java are provided with irrigation in one form or another as explained above. An irrigated field is assured of its supply of water although the amount may be reduced on account of diminution of supply. Schedule of delivery may

be changed from continuous flow at times of plentiful water supply to intermittent and rotational delivery at times of limited supply.

Transplanting the seedlings may be done with or without water in the puddled field. Where the field is drained at transplanting time, the water is admitted in the field two or three days later and kept at a depth of about 10 centimeters. First drainage of the field for a duration of three days takes place 30 days after transplanting. After the first drainage, submergence to a depth of about 10 centimeters until flowering follows. The field is drained for the second time for a duration of three to four days. The reason for the second drainage, I was informed, is to obtain more uniform flowering. After the second drainage, the field is again submerged to the same depth and remains submerged until three to four weeks before harvest time. This irrigation schedule seems to be a common practice in Java. However, some farmers, I was informed, transplant the seedlings with the puddled field in about 10 centimeters of water. The reasons given for this practice are: (a) faster recovery of the transplants by preventing them from drying; (b) the presence of water serves to cushion the seedling, thus preventing them from breaking by wind action during the first few days immediately following transplanting; and (c) most weed seeds do not germinate in the submerged soil.

Fertilization

Most of the rice fields in Java vary widely in their productivity. Some explanations offered for this are the differences of the soils, their continuous annual single or double rice cropping, and the limited use of commercial fertilizers. Studies undertaken by the General Agricultural Experiment Station showed nitrogen deficiency in about one million hectares of rice land and phosphate deficiency in an equal area. In spite of the results of experiments showing a 20 percent increase in rice yield from the use of about 100 kilograms of ammonium sulphate, (21 per cent nitrogen), and an increase by at least 50 per cent from the application of double superphosphate, (40 per cent P_2O_5), separate application per hectare, the limited supply of these fertilizers in the country restricts their extensive use.

An effective means of supplying the nitrogen deficiency of rice soils in Java and other islands is the practice of green manuring. Rice farmers are utilizing the results from considerable rice manuring experiments undertaken by the Soil and Fertilizers Institute and Agronomy Division of the General Agricultural Experiment Station at Bogor. A wide practice among rice farmers is to interplant at a later date the green manure crop, usually a Crotalaria species, Cr. Juncea, with such secondary crops as corn, peanut, and soybean that are raised following the west-monsoon (April, May, and June) rice crop, and then to plow it under after harvesting the secondary crop. Results from the use of green manure shows that 1.25 tons of green manure per hectare of some nitrogen-deficient soils results in as much increase in yield as 100 kilograms of ammonium sulphate per hectare, thus giving the farmers strong reason for advocating the practice of rice manuring.

Harvesting and Drying

The common method of harvesting rice in Java is cutting the individual culms or heads to a length of 30-35 centimeters with a hand-

knife called "ani-ani" in Indonesia, which corresponds to our pang-ani in the Philippines. Women usually do the harvesting. The "ani-ani" knife or blade is fitted to a wooden and/or bamboo frame of different shapes and patterns. For bearded varieties of rice the cut panicles with short straw are tied in bundles ranging from five to ten kilograms in weight. The unbearded shattering varieties like the *Bengawan, Mas, Remadja*, etc. are placed in sacks or baskets. Quite similar to our Philippine custom, any villager desiring to participate in harvesting may do so on share basis, the harvester getting from one-fifth to one-tenth of his harvest, depending on his participation during transplanting and weeding operations. After removing the harvesters' share, the harvest is hauled to the farmstead for drying and later storage usually in bamboo barns.

Because no mechanical drier is used in Java, sun drying is the usual practice. Some bundles of rice are spread to dry on mats, on the ground, and on concrete floor, while others may be placed on poles or on roofs. The dried bundles are stored until they will be threshed and milled.

Threshing and Milling

Unlike the practice in some parts of the Philippines, rice is not threshed in the field. When needed for home use, rice is threshed with the feet and milled in mortar with pestles. If rice is sold to millers, it is still in bundles and the millers thresh as well as mill it using standard commercial mills. Based on the wet gross weight of the bundled panicles or rice heads with short straw, the average milling recovery is about 33.3 per cent, and as much as 65 per cent if based on the dry weight of the rough rice or palay. The latter figure is lower than the average milling recovery of our Philippine rices from cone rice mills.

Varieties and Yield

As has been stated above, Java rice soils vary widely in their productivity. From the fertile lands of Java as much as 100 quintals of wet panicles with straw head per hectare, or 60 cavans milled rice per hectare, are often produced. However, in some areas as low as 10-12 quintals of wet panicles per hectare, or six to seven cavans milled rice per hectare is a common yield. The considered average yield for Java is 20-22 quintals of dried panicles per hectare or 23-26 cavans milled rice per hectare.

Of approximately 3.4 million hectares usually under rice in Java, 2.4 million hectares are planted to Bengawan. This variety gives an average yield of 27 cavans milled rice per hectare at the Experiment Station, and slightly lower for the national average. This variety is paid a special price on account of its better eating quality. *Remadja* variety yields 27.5 cavans milled rice per hectare; *Mas*, 21 cavans; *Intan*, 21 cavans; and *Sigadis*, 28 cavans. *Sigadis*, meaning "sweet seventeen", may eventually replace Bengawan on account of its better yield, denser panicles, two weeks earlier maturity, and more resistant to stem borer and to lodging than Bengawan. The variety, which was obtained by crossing Indonesian Benong 130 and Bluebonnet from the United States in 1949, was released in 1954.

Crop rotations of some form are becoming more and more popular in Java. Although two crops of rice are produced in one year, sometimes five crops in two years are raised from the same land. For several years, the number of rice farmers that practice crop rotations has become encouragingly greater. The trend of better farming practice is due, in a large measure, to the efforts of the men in the General Agricultural Experiment Station entrusted with rice-crop improvement.

Some farmers fallow their fields for a few months between harvesting rice and planting corn, mongo or peanut. The corn crop may or may not be intercropped with legume. Following corn will be another crop of rice. Other farmers plant rice followed by tobacco and again rice in the second year.

Another profitable rotation is raising fish between rice crops. The duration of fish culture depends on the fish grown, availability of sufficient water to maintain sufficient depth, and growth of the fishes. While some farmers use fish in their rotation schedule, others raise fish during the growth and development period of the rice plants. This is usually done by placing small fishes, size about three centimeters, in rice paddies two weeks after transplanting, and rearing them for 70 days, at which time, the fishes will have attained 15 centimeters in length. The fish crop may then be harvested once by draining or gradually by means of nets and/or traps.

References

EFFERSON, J. N. "The Production and Marketing of Rice". *The Rice Journal.* New Orleans: 1952.

PREGER, W. *The Gods Gave Rice.* The Hague: W. Van Hoeve Ltd. 1955.

SIREGAR, H. "Freedom is New, but Rice is Old". *International Rice Yearbook.* New Orleans: 1956.

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THE CHANGING ATTITUDE OF FARMERS IN PUMP IRRIGATED AREAS IN THE BICOL PROVINCES

LEONARDO MARIANO, JR. AND RAOUL R. URSUA [1]

PREFACE

This is the first of a series of technical and popular papers containing information regarding new developments of interest towards modern farm techniques as a result of the installation of pump irrigation systems.

In the relentless drive to convince farmers working on pump irrigation areas to practice improved and tested methods of farming, it took the Irrigation Service Unit four years to unfold the crowning realization that those four years were not a waste of time. For this paper, as its title suggests, puts forward the fact that there has been a change which is certainly worth noting. How this changing attitude, from skepticism to enthusiastic willingness, is slowly but surely influencing the socio-economic ways of living of all elements of society in the Bicol Provinces, is well pointed out by the authors.

Moreover, in organizing and shaping the contents of this manuscript, the authors had in mind to keep it interesting to pump irrigation-conscious farmers and challenging to the minds of those skeptical about modern farm practices especially in areas with irrigation facilities.

Reports of agricultural offices, information gathered from direct interviews with farmers, and constant on-the-spot observations of the authors in connection with their work as district field supervisors helped a great deal in the preparation of this paper.

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INTRODUCTION

The first irrigation pump system installed by the Irrigation Service Unit in the Bicol Region was in 1953. After almost four years, the ISU installed 21 pump units in 18 projects in Camarines Sur, Albay, Sorsogon and Catanduanes. Four more projects are under construction and five are under study. The 18 pump projects cover 7,400 hectares of irrigable land. With a potential yield of 590,000 cavanes yearly, the irrigated land promises to boost local farmers' annual income to ₱4,720,-000. These are impressive figures surely, but they are without meaning unless evaluated in terms of goals and objectives.

In anticipation of the plan to re-organize the Irrigation Service Unit, an evaluation of its accomplishments might prove useful in exploring its future role in the overall governmental scheme. Such evaluation may be approached from different angles depending on the issues involved. The direct and visible contribution of a service agency may be a good yardstick of its effectiveness. On a broader scale, however, the effect of the service on the attitude of the recipients may serve to

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be a more useful criteria. Also, the governmental service in question is best evaluated alongside the attendant social, economic and governmental environment.

The purpose of this article is to note the changing attitude of farmers belonging to irrigation associations in the Bicol Region towards modern farming methods. The "before-after" technique is used to identify the change in attitude. As a qualifier, the attitude of non-members of the irrigation associations was also studied simultaneously, especially with reference to the "before" conditions. The basic data for this article have been gathered through interviews and questionnaires with the assistance of the personnel of the irrigation associations' offices. Supplementary data came from numerous government documents and publications such as the annual reports of the Department of Agriculture and Natural Resources and the 2-volume, Philippine Agricultural Statistics.

Before the Installation of the Irrigation Systems

The deplorable state of agricultural affairs in the Philippines is eloquently depicted by the *Hardie Report* and the *Rivera-McMillan Report*. The cumulative effects of the agricultural conditions as described in these reports are manifested in low economic productivity, wide-spread unemployment and under-employment, meager income, low levels of living, and unsatisfactory landlord-tenant relationship.[1] No less disturbing are conditions in the Bicol Region. Farmers do not possess the necessary means to improve their farm methods, and government assistance in this field is practically negligible due to lack of necessary field personnel.

Under such circumstances, the attitude of farmers towards modern farm practices is that to apathy, if not of outright indifference. There are numerous inter-related factors that contribute to the assumption of this attitude but for practical purposes they may be broadly classified as: (A) Government, (B) Economic, and (C) Social.

Agricultural Assistance from the Government

Improved or modern methods of farming should logically be introduced by the Department of Agriculture and Natural Resources with its field offices. For one thing, the Department has the technical and financial resources to back up its reform program. It is a sad commentary on the part of the government, however, to be remiss on its agricultural obligations. About 85 percent of the people in the Philippines, directly and indirectly, depend on agriculture for their livelihood and yet only about 4.6 percent of the total national appropriation in 1956-57 goes for agricultural purposes. As a consequence, an ordinary farmer seldom gets in close contact with government field agriculturists who can not visit a municipality frequently.

Agricultural assistance from the local government is no better. Because of the little amount of money that goes to the local agricultural fund, only one person is expected to look after the agricultural needs of one or more municipalities. With barrio roads hardly passable during

[1] G. F. Rivera and R. T. McMillan, An Economic and Social Survey of Rural Households in Central Luzon (Philcusa-Foa), Manila, June 1954, p. 3.

most part of the year, whatever effectivity the agriculturist has as a field agent is thus nullified.

While it is true that thousands of farmers are reached by government agriculturist during the year, their over-all assistance is only more apparent than real. Ordinary farmers do not learn or appreciate improved farm techniques in one sitting. They need to be constantly reminded and thoroughly convinced of the desirability for a change. Follow-up explanations and practical demonstrations are good devices of "selling" modern farm methods. Yet the present governmental structure provides only for a limited application of such follow-ups and demonstrations.

Under such circumstances, therefore, the farmers may either have a negative or indifferent attitude towards modern methods of farming. Negative — because they seldom, if at all, have occasions to know what the modern trends are. Indifferent — because they have not been completely sold to the idea of reforms in the absence of a demonstration of the practicability of modern methods of farming. When these situations are equated with the tendency of the farmer to look PATERNALISTICALLY upon the government for any agricultural changes, their negative and indifferent reactions may seem understandable. The *handout* mentality of the farmers may have been the result of our unitary system of government and the need for a centrally-planned and executed economic program to solve our pressing socio-economic problem.

Inadequate Economic Resources

If the government seems to be failing in introducing modern methods of farming, then reform may come from within — from the farmers themselves. They are aware now, more than ever, of the need to increase agricultural output considering that a peso today does not buy as much consumers goods as before. Meanwhile, the population is increasing. While the need for reform is evident, a general picture action of the needs, however, does not seem encouraging.

The per-capita income of the small farmers is hardly sufficient for their daily livelihood and whatever plans they have to apply modern farm techniques remain but speculations. The labor earnings of farmers in Central Luzon average less than ₱250.00 a year.[2] (The average per-capita income of the Bicol farmers interviewed is about ₱200.00). Any change in farm practice means the backing of sufficient capital which an ordinary farmer does not have. They barely have savings. In fact, most of them are usury victims. The use of fertilizers, the use of better or certified seedlings, the careful plowing and planting incident to the application of the Masagana culture of planting, the constant inspection of the growing crop all directly involve much capital. Capital would also be involved indirectly, since the suggested reform may call for time now utilized by farmers for other purposes.

Ironically enough, the presence of rich agricultural resources in the Bicol Region may account for the lack of enthusiasm in agricultural reform. Farmers are not concerned with increased rice or corn production since they have other means of livelihood such as the dense forests,

[2] G. F. Rivera and R. T. McMillan Report, p. 71.

resourceful fishing grounds, rich vegetation, wide coconut and abaca plantations, and thousands and thousands of rich uncultivated farm lands. In Central Luzon where land area is no longer as virgin as that in the Bicol provinces, the quest for increased crop production becomes a premium.

The landowner-tenant problem in the Bicol Region does not seem to be as serious as it is in Central Luzon. Some quarters even consider the present relationship to be more advantageous to the tenants. A local wag even commented that "if the present arrangement is not changed, the landlords may yet turn into Huks". This situation may partly explain the lack of interest among landowers in improved farm practices; whatever increase may be obtained in agricultural yield, the landlord may conclude, would just revert to the tenants. Another reason may be the pre-occupation of the absentee landlords with their primary business interests.

At this juncture, it may again be stated that the attitude of the farmers towards modern farm methods cannot be accurately determined in the absence of an intimate and working knowledge of the methods to be introduced. Farmers prefer to play safe with the old-age practices, for reason of survival perhaps. The yield from their farms is their primary source of income. For this reason, they would like to see others apply modern farm practices first to observe their workability. A failure in the new agricultural endeavor may mean hunger and misery to the farmers and their families.

Social Resistance or Reluctance to Change

Modern technological changes are seldom welcomed. The history of technological invention is replete with instances of indifference or even opposition adopted by the public towards objects which may disturb the *CONVENTIONAL* way of living. Farmers, because of their relative isolation from worldly happenings, are especially prone to generate resistance to change. The old village philosophers, invariably the spokesmen for the community, represent the force that fights for the retention of the conservative modes of life. They are usually narrow-minded and uneducated whose knowledge on farm techniques is limited to personal and at most local experience. A government official once jokingly advocated the killing of all village elders to enable the government to pursue its program of agricultural reform unhampered. Happily enough, such a drastic measure remains an ordinary whim. The influence of the village philosophers, particularly in irrigation projects, is diminishing due to constant agricultural propaganda, education and information.

The fear that farm mechanization will lead to more unemployment is an important reason why farmers are reluctant to accept farm reforms. The table below clearly indicates the increase in labor force.[3]

Provinces	*Increase in population since 1938*	*Population in 1948*
Albay	57,881	394,694
Camarines Sur	169,370	553,691
Camarines Norte	9,910	103,702
Sorsogon	56,599	291,138

[3] Hardie, Landed Estate Reform (Philcusa-MSA) Manila.

Farm mechanization may even mean greater employment if more virgin lands, which are abundant in the Bicol Region, are opened to modern methods of farming.

The farmers have been greatly influenced by the antiquated methods used by their predecessors. A farmer's philosophy is — "What was good for my father and grandfather is good enough for me". He is generally contented with a small harvest which may be enough to feed his family whose needs are simple and few. Only the more intelligent farmers dare try the modern farm practices being preached by government personnel. In some cases, too, the farmers are prodded by interested landowners to discard the antiquated method of farming.

As a general rule, however, landowners are not at all interested in the progress of their farms. They do not visit the farms to inspect the condition of the growing plant; they do not even care how their tenants plant, what they plant, and when they plant. They just wait for the tenants to deliver to their homes their share of the produce during harvest time. (Some landowners, however, supervise the harvesting of the crops to avoid being cheated of their shares.) Of the farmers and landowners interviewed, only 20 to 30 percent of the landowners take general interest in improving the farm. The following are some reasons given for the lack of interest: 1) reluctance to invest capital needed for farm improvements, 2) engagement in other profitable public and private ventures, 3) lack of information on how to increase crop production.

Improved farm methods involve much complicated work and supervision. The inertia of the simple plant-harvest method of crop production may work against the acceptance of the new farm techniques. The following are some tasks to be performed incident to the adoption of the farm reforms: — The farmer has to survey his fields and possibly neighboring farms to locate the spot where healthy and sturdy palay crop grows. The seedlings should come from this source if not from government seed farms. The seedlings are then soaked in a salt solution before broadcasting. The farmer has to plow and harrow his fields at least twice before the seeds are planted. The fields have to be weeded too. Then at the outset, the farmer has to use the Masagana system of planting. The seedlings are placed in rows separated by measured distances, so that the plants may get much air and sunshine and enough nourishment from the bigger soil area around each plant. The farmer has to weed his fields constantly, because weeds absorb substances meant to be taken by the growing crop. (In the Bicol Region, weeds and grasses are especially abundant because of the wet climate conditions). In order to increase the agricultural output, the farmer has to apply fertilizer for which he has neither the money nor the time, or even inclination.

The above farm practices, of course, represent the ideal. But the sad fact is, majority of the farmers continue to plow their land only once if ever, to use unselected and untreated seedlings and plant them haphazardly, and to let the weeds and grasses grow with the palay plants.

The common practices of the farmers in the Bicol Region thus follow a certain pattern: they prepare their land, most often haphazardly and seldom more than once. Then they transplant the seedlings when rain comes. No other task follows after planting. The seedlings, the growth of weeds is not controlled, the presence and subsequent control of pests and diseases is practically ignored.

The reason for this neglect of the growing plant is not hard to find. The average yearly income of the farmers is only about ₱200.00. The search for more sources of livelihood is therefore an inevitable consequence. Any odd jobs would do — fishing, handicraft, working in other places, etc. It has been observed that the income from these secondary sources (side-lines) even exceeds the income derived from farms.

With regards to the control of plant pests and diseases, only very few farmers are buying chemicals and insecticides for such purposes. The farmers have no money to buy insecticides in the first place, and the government assistance either in the giving out of free chemicals or the handing out of advice has not been regular. Superstitious beliefs, furthermore, hinder the program of combatting plant pests and diseases. The farmers believe that the rat infestation of rice fields, for example, is an act of God and any attempt to destroy the rats will only make God angry and will result in the increase of more rats in the area. The "anito system" depicts a farmer, believed to possess supernatural power, going around the fields spitting "buyo" on the pest disease-infested crops. Medicinal plants are believed to be helpful in driving away plant pests and diseases, are placed near the growing plants.

Two other cultural or social factors that indirectly resist change are the "mañana" habit and the aversion to manual labor. While the first contributes to the negative attitude of believing "things will get better tomorrow," the second positively encourages avoidance of manual work upon which any agricultural reform is premised. Also, while the first factor seems to perpetuate the outmoded but unfortunate working practices of farming, the second seems to force relatively more intelligent persons to pursue white-collar professions and to relegate the farming profession to relatively mediocre minds. Some of the farmers interviewed remarked that they have sent their more intelligent children to college, while the less intelligent ones will have to mind the farms. Enrollment in agricultural schools is increasing, it is true, but not yet enough to offset the influence of the two cited factors.

Furthermore, the dull barrio life is conducive to the formation of routinary working habits. Any challenging offer such as improved farm techniques, the ordinary farmer can hardly comprehend. This may be one reason why the community reading centers or public activities fail. The literary rate remains low in the rural areas despite a significant increase on the national scale. What people understand and talk about are the activities of their neighbors and politics drawn on the personality level to invite comprehension.

Resistance to the introduction and the subsequent adoption of improved farm methods is that fostered by several cultural and social factors. While the bad influence of these factors individually could easily be minimized if not eliminated, this consolidated effect, as contributory to resistance to change, is worth noting.

Qualification

It may be safely stated that the attitude of farmers in the Bicol Region towards modern methods of farming BEFORE 1953 is anything but changing. This conclusion, however, must be qualified by an overall observation of agricutural development. After all, the Bicol Region is only a small part of the Philippine Archipelago.

The Philippine government has not totally neglected its duties to improve the agricultural condition of the agricultural country. The creation of several agencies during the last few years to solve or ameliorate particular agricultural problems is a tangible proof of the government's interest in our agricultural welfare. Such agencies include the Bureau of Agricultural Extension, the Office of the Agricultural Information, Division of Agricultural Economics, Fertilizer Administration, Court of Agrarian Relations, Agricultural Credit Cooperative Financing Administration, National Tobacco Corporation, National Rehabilitation and Reconstruction Administration and of course, the Irrigation Service Unit. (The newly re-organized Department of Agriculture and Natural Resources and even the DANREA will furthermore increase the effectivity of these agencies). Because of the recency of their establishments, the national impact of these agencies, either overall or individual, on the agricultural side, has not yet been strongly felt. For example, a well administered FACOMA may influence the farmers to adopt a more favorable attitude towards other farm improvements. As an indication of progress, it should be noted that the annual gain in our agricultural production (5.8%) is running ahead of the increase of our population (2.5%).[4] Suffice it to say though, that if this article were written ten years from now, the stated conclusion shall have been different.

Improvement in other national lines of endeavor should likewise be noted. The self-help program (through the assistance of the International Cooperation Administration of the United States), the adult-education program, the feeder road program, land reform and the *puroks* or community projects of the Bureau of Public Schools, to mention a few, are undertakings which may yet enable the farmers to adopt a more constructive attitude towards changes in their inefficient and ineffective agricultural practices.

The discussion about the characteristics of the farmers and their environs is of course general in presentation. Now and then, there are exceptional farmers who rise above the common level and recognize the desirability of "going along with the times and progress."

At any rate the stated conclusion still holds true. A discussion of the people's reaction to irrigation now follows.

After the Installation of the Irrigation Systems

This article, as its title suggests, is premised on the assumption that the attitude of the farmers in the irrigation associations in the Bicol Region towards modern farm techniques is changing. This assumption is derived from close observation of agricultural problems by these writers in their capacity as District Field and Assistant Field Supervisors of the Irrigation Service Unit for the Bicol Region. Intimate acquaintance with numerous landlords, tenants and independent farmers and their working conditions for the past three years has enabled these writers to offer, with some confidence, the assumption of a changing attitude. To increase the reliability of the writers' observations, a written questionnaire on the "attitude problem" was prepared and sent to 153 individuals.

[4] Annual Report of the Secretary, DANR, 1955-56, p. 1.

"What is the direction of the changing attitude," would be the next logical question. On this matter, this article further assumes that *a more favorable attitude towards modern farm methods has developed since the installation of irrigation facilities in the Bicol Region.* While it is fool-hardy to try and explain the exact causes for this development, some obvious factors which contribute to a general acceptance of modern techniques of farming have been identified. For clarity of presentation, these factors may be classified as: A) Improvement in the government's pump irrigation program, B) Increased agricultural output, and C) Increased agricultural services.

Improvement in the Government's Pump Irrigation Program

The installation of the pump irrigation systems was originally the primary function of the defunct Irrigation Pump Administration (IRPA) under the Department of Agriculture and Natural Resources. Bicol farmers had an unhealthy attitude towards the previous pump administration in view of the fact that it was not able to satisfy the needs of the farmers due to limited appropriations of the government. There was not much misgivings therefore when the IRPA was abolished in 1912 and the Irrigation Service Unit (ISU) was subsequently created in the Department of Agriculture and Natural Resources to implement the Quirino Foster Agreement. In 1954, the ISU was transferred to the Department of Public Works and Communications under which it is still, at present.

The main goal of the ISU is this — "Aid is given to an association of landowners and farmers for the construction and installation of irrigation pump systems so they can have a controlled and regulated supply of water for their crops whenever water is needed as a means to increase their regular crop production and enable them to plant a second crop during off seasons, especially of the staple crops, rice and corn, with the end in view of bolstering the living conditions of the farmers".[5] It is only when the gravity type of irrigation is not feasible, that the ISU enters into the picture.

The Irrigation Service Unit was created in 1952 and four (4) months after the application of the Porobatia Irrigation Association for an irrigation pump, its installation was favorably acted upon. Five months later, the construction of the irrigation pump project was started. The experience of the local farmers with the IRPA stood out in direct contrast to the accomplishments of the ISU. The activities of the ISU were at first viewed with skepticism and justifiably so. The fast and efficient service of the ISU must have been reacted to by an "I don't believe it at first" attitude.

The farmers in the Bicol Region, unlike those in other areas, were initially not enthusiastic about irrigation pump projects. The installation of pump units would require the formation of an association of landowners and the subsequent application for such pumps with the government's irrigation office. With these requirements, it is not hard to explain the lack of enthusiasm considering the previous unhappy experience of farmers and local agricultural officials with other govern-

[5] Annual Report of the Irrigation Service Unit, 1955-56.

ment offices. The majority of the farmers involved, especially the tenants, accepted the irrigation plan not because they believed in its effectivity or efficacy to increase crop production but because they were curiosity-seekers. The approval of all farmers, whose lands are involved in the irrigation projects had to be won. The decision of any one of them to withhold the granting of right of way might mean months of delay, especially when expropriation proceedings have to be instituted.

The successful operation of 148 irrigation pump projects in other parts of the Philippines [6] may have paved the way for the willing acceptance of the idea of self-help in the construction and installation of irrigation pump systems — with all its impending obligations. The ISU constructs, and installs the pump system upon request of an association of farmers whose farms will be irrigated. The entire cost of the project is then amortized by the irrigation association in 10 years. It is interesting to note that a 150 percent increase in amortization payment was registered in the Bicol District as compared to that of last year. Nine irrigation associations out of seventeen which operated this year presented partial amortization payments to the Administration during the Irrigation Day Celebration in Libmanan last December 8, 1956.

Increase in Agricultural Output

The increase in the cavanes of palay harvested during the two years because of the installation of irrigation pumps is tremendous. In Libmanan, Camarines Sur, the average yield per hectare was about 27 cavanes per hectare before 1953; in 1954-56, the figure jumped to about 50 cavanes. Likewise, the 100 cavanes per hectare mark was registered for the first time in some pump projects. The presence of water (made possible by the irrigation pumps) accounts primarily for this crop improvement. The yield every harvest does not only increase in the process but a two-crop harvest a year is also accomplished. The Bicol farmers, used as they are to low agricultural output, have been responding to the increased yield with the customary manner, by celebrating religious fiestas with pomp. In Central Luzon, Rizal and Cavite, the average yield per hectare is only 27 cavanes. In the few farms which are irrigated, the average yield increases to 27 cavans.[7]

The issue has not yet been entirely won, however. A few farmers still refuse to use their land for a second planting during the year. They believe that the two annual harvests might entirely sap the soil of its fertility. Another of their wrong impressions is the alleged susceptibility of irrigated land to plant pests and diseases. The constant education of the farmers, with the assistance of the different offices of the DANR, on the application of approved agricultural practices will do well to erase these wrong impressions.

Floods occur during the months of November and December in the Bicol Region, particularly Camarines Sur. The most recent flood this month (December, 1956), caused by Typhoon "Polly" inundated the entire irrigable area of all pump projects in Camarines Sur. Fortunately, there was no crop damage in the irrigated fields because harvesting was over. Thanks to the irrigation systems, the farmers can start planting

[6] Annual Report of the Irrigation Service Unit, 1955-56, p. 8.
[7] G. Rivera and R. McMillan Report, p. 67.

early enough to enable them to time the harvest before the flood season ensues. (The planting calendar for each irrigation project was prepared jointly by the BAE, Association's officials and ISU district personnel.) Floods destroy millions of pesos worth of crops as witnessed in the recent destruction caused on non-irrigated fields. Farmers have much to be thankful now that the effects of these floods were minimized if not at all avoided. The national average yields per hectare area is 36.2 cavanes. Some of the causes of the low average yield are floods, drought, rice stem borers, army worms, rat infestation and impure seeds.[8] The underscored causes are partly or wholely taken cared of the irrigation pump systems. The elimination of the other causes will also be explained.

Increase in Agricultural Service

As mentioned a while back, the farmers whose lands are affected by a common irrigation system are organized into an irrigation association. Under such arrangement, an increase in agricultural services has been made possible by: 1) making the farms operated by the associations into model farm or project and 2) by practically turning the association into a cooperative.

The District Agriculturist for the Bicol Region has been impressed by the interest generated by farmer-members of the irrigation associations in improved farm practices. After the pump installation, the project's irrigated areas are made pilot projects as per agreement made by the ISU and the Bureau of Agricultural Extension. More technical assistance is thus given to the farmers. Demonstrations on modern farm practices are held; the farmers are taught how to prepare the land properly, how to apply fertilizer, etc. The Bureau of Plant Industry immediately acts whenever pests and diseases attack the crops. Fertilizers, chemicals and insecticides are given free. The Bureau of Soil Conservation analyzes the soil content also free of charge.

All irrigation associations are required to make at least a one-hectare demonstration lot on the Masagana culture of planting. Yields from these lots were outstanding with yields reaching the 100 cavanes per hectare level. For the first time in history, farmers are applying fertilizers regularly and with greater quantity and in wider areas. Trial plots on pests and diseases control are also set up. Seminars on pests controls, of which two were held this year in 4 projects, are also held. Meetings and seminars on other agricultural problems are also held from time to time.

The lack of enthusiasm of farmers in irrigation projects, and its causes, has already been stated. This sad note, happily enough, is fast disappearing. The majority of the landowners and farmers interviewed are now optimistic about the future of the irrigation projects. Plans are now being made by the different irrigation associations to institute better management and service practices. The establishment of a permanent office of each association, complete with office equipment and office personnel, is being contemplated. A cooperative store for the employees and members of the association, and a warehouse are also being considered. A monthly newsletter will soon be published regularly

[8] Annual Report of the Secretary, DANR, p. 80.

by some associations. And of course, the regular maintenance of the irrigation canals and laterals will be so planned that sufficient water can reach every irrigable area.

Because of the success of the pump project in some localities, almost all elements of civic societies, churches, social organizations, etc., are showing interest in farm improvements. The Libmanan Service Club, in Camarines Sur, an organization of professionals, will donate a big trophy next year to the irrigation association which can give the best service to the farmers. Rev. Fr. C. Sanchez even took a two-month course in agriculture at the Araneta Institute of Agriculture so that he can give lectures on farming to members of the associations in his parish.

Conclusion

Broadly speaking, the attitude of the Bicol farmers towards modern methods of farming would be favorable in the long run especially where there are irrigation projects. The various rural improvement programs of the government, notably the community development project, are all geared to assist the farmers individually in a higher standard of living. And the fulfillment of this plan could only be made possible by the adoption of improved farm techniques and the unselfish cooperation of the people. The TIME ELEMENT, therefore, is the main factor that enables the irrigation projects in the Bicol Region to serve as a trigger pin for the launching of farm reforms.

The government should exert all its efforts in selling farm reforms. After all both national and local governments have stakes in the more effective development of our national economy. The national government is interested because the success of its program of industrialization must be based upon a sound agricultural environment; the local government is also interested because, among other things, its local revenue will be greatly boosted by the real property tax collection, the increase of which will inevitably come from an increased assessed valuation of the improved property. The farmers should be taught the nature and effects of farm reforms. The attitude of Bicol farmers towards farm mechanization leading to unemployment should be reexamined.

It is said that success begets success or rather success whets one's appetite for more success. It is, therefore, hoped that the constructive direct and indirect accomplishments of the irrigation projects will serve to hasten the acceptance and subsequent adoption of improved methods of farming.

GEOGRAPHIC SUMMARIES

THE PROVINCE OF ALBAY

By Ellen Paglinauan [1]

Editor's Note: This issue of the *Philippine Geographical Journal* introduces a new feature, GEOGRAPHIC SUMMARIES. Every article published under this heading is purposely made brief and compact. The author attempts to portray a typical area, his home province or a province in which he has some personal interest. It is believed that knowledge gathered from personal observations, as well as on statistics or other published materials of a given province, city or municipality of note, may set the minds of readers to geographic thinking and initiate a most ardent love for geography.

GEOGRAPHIC SUMMARIES is also useful material for research as it is a made-to-order source of unlimited information about Philippine geography. The three summaries included in this issue were prepared initially as a class assignment for Dr. Alden Cutshall in his course "Geography of the Philippines." The Editor will welcome similar summaries for inclusion in future issues of the *Philippine Geographical Journal.*

Albay, which makes up one of the six provinces of the Bicol Region, is located in southeastern Luzon. It has 19 towns with Legaspi as its capital. Its total area of 989 square miles also covers the 4 small islands (Batan, Cagraray, Rapu-Rapu and San Miguel) located on the Pacific side of the Albay mainland. The topography of Albay consists of mountains, foothills, narrow coastal plains and broader valleys, the entire area of which is perennially green. The mountains are V-shaped, at the juncture of which lies the 7,943-feet-high Mayon Volcano, a distinctive landmark. The two larger plains are the Tabaco Coastal Plain and the Legaspi Plain, the latter extending in a northwesterly direction from Albay Gulf across the province to Lake Bato where it connects with the southwest end of the long Bicol Plain. The Province is drained by numerous small streams and rivers that rise near the foot of Mayon Volcano and flow out into Lake Bato, Tabaco Bay, or Albay Gulf. The largest river is the Yawa River which cross the Legaspi Plain.

Of the four types of climate normally recognized in the Philippines, two are found in Albay: Types B and D. Eastern Albay has Type B which is characterized by a pronounced maximum rainy period in the cool months with no dry season. Southwest Albay has Type D, which is characterized by insular uniformity of rain throughout the year with no dry season and no very pronounced maximum rainy period. Temperatures are comparatively uniform and rarely exceed 95°F or fall below 65°F. At Legaspi, the warmest month (May) averages 82.9°F and the coolest month (January) has an average of 78.3°F. The winter and summer monsoon winds prevail. Albay lies in the typhoon path and an average of 4 typhoons annually cross over the province, usually during the period from September to November.

Fertile soils and a favorable climate contribute to make Albay basically an agricultural province. Comparatively accessible by land, air and sea, Albay presents a scenery of an unbroken vista of vegetation that is divided among rice, abaca, and coconuts, the region's principal crops. Rice fields dominate the lowland landscape, with abaca and co-

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conut in the rolling uplands and hillsides. Rice fields are found principally in the lower valleys with innumerable streams, and on the plains around Mayon Volcano whose periodic eruptions have greatly increased the fertility of the soils. Abaca is the money-crop and the source of the province's fame in world trade. In acreage and in production, Albay ranks second among the abaca provinces, outranked only by Davao. Abaca plantations are distributed throughout the province but the largest ones are concentrated in the Ligao-Iriga area and on the lower slopes of Mayon Volcano. At present, one of the most promising industries of Albay is the manufacture of abaca rugs, placemats, slippers, bags and sinamay cloth which are sold abroad and locally. There are now several private firms engaged in the manufacture of these articles. Albay ranks only sixteenth among the coconut-producing provinces in the Philippines. Nevertheless, copra compensates, for this is still one of the major exports of the province. Coconut groves are located chiefly on the hillsides north and south of Legaspi Plain and along the shores of coastal towns of Tabaco, Bacacay and Libog. Some of the minor crops are corn, camote, gabi, cassava, fruits and vegetables, and pili nuts.

The province has limited mineral resources. Coal reserves are found in commercial quantities on Batan Island while copper ore and limestone are mined on Rapu-Rapu Island and in Ligao, respectively. The abundance of clay has given rise to the pottery industry with Tiwi town as its center. Construction materials like timber (apitong, narra, yakal, and lauan), nipa palms, rattan and bamboo are also available.

The 1948 Census reported the population of Albay as 394,694 with a density of 254 persons per square mile. The population has naturally been greatly concentrated where good land communication, rivers, and the sea have permitted trade to develop. Legaspi and Tabaco, with a population of 41,171 and 33,209, respectively, are the two most densely populated towns for the reason that both land, air and water transportation are available. Furthermore, these towns are the ports of entry and the hemp-exporting and copra-exporting centers. As a whole, Albay has no pressing population problems like overpopulation or unemployment.

The favorable climate, lush vegetation, and beautiful scenic spots combine to make Albay possibly one of the future playgrounds of the Philippines.

GEOGRAPHIC SUMMARIES

THE PROVINCE OF LEYTE

By Lee Schwarz [1]

From its human standpoint, two primary geographical features make Leyte commercially significant. The most obvious and most extensive is the Central Cordillera, a high mountain range that extends its whole form through the entire length of the main island and which accounts for the minor islands in the province. The Cordillera is a human barrier as well as a major climatological factor. Trade is carried on between western Leyte and Cebu, and the people are, for the most part, Cebuano by dialect and custom. Because of the central barrier, the western part of the island has primarily monsoon precipitation, about enough to have a year long wet season, averaging 103 inches annually in Ormoc. In contrast, eastern Leyte, although without a dry season (a five-inch minimum monthly average at Tacloban) has a distinct rainy season during the post-monsoon influx of the north-east trades. Commercially, Tacloban, the island's largest and best port, serves also as the import-export hub for southern Samar.

The rough highlands, which cover one-half of Leyte's 800,000 hectares, are a valuable source of lumber, and much of the area is still in primary forest. On the slopes, soil is poor, for the most part, and now a picture of *Kogon* grassland. A few *kaingineros* work in scattered areas. Mineral deposits are minor and consist of coal, manganese and gypsum that are not yet developed and asphalt which has been used for road surfacing.

The second important area of Leyte is the large plain in the northeast. A geologically new plain, it has rich, alluvial soil which is very deep, friable, and free from stones. What accounts perhaps for Leyte's agricultural importance in the Philippines and also for its high population (1.1 million in 1948), is its wet and poorly drained plains all of it less than 30 meters above sea level. It is also the reason for its being the largest rice-producing area in the province, the only area, in fact, that produces more than it consumes. Even so, Leyte must import rice; about one million cavans annually. In the higher, yet dry parts of the plain, corn is also grown and helps to supply the western part of the island which is a corn-eating area. Only one crop is now raised on the plain, although two can easily be grown.

Other significant parts of the province are the numerous, small, narrow, non-contiguous coastal plains scattered around the island. The primary product of this region is coconut, which is intensively cultivated, making it the province's number one crop. In the immediate coastal area, poor drainage usually results in brackish water and mangrove swamps: farther inland are the coconuts along with some other food crops. On the slopes, the slightly-rolling land and better-drained areas, abaca and corn are raised. One significant exception to this pattern is

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the Ormoc Plain which is the sugar-producing area of Leyte. For this reason, it is also the second largest population center, topped only by Tacloban.

In view, Leyte's even, high rainfall; high humidity; even, high temperatures; fertile plains soils; and good port make it an important agricultural province for easy raising of crops such as coconuts, corn, rice, abaca, and sweet potatoes. In addition it produces 25% of the *gabi* of the Philippines. A few important minerals and the recent speculation on the presence of coal and oil plus a high livestock total make it an increasingly important province in the nation. Its major problems are the problems of irrigation and drainage and their relationship to proper land utilization.

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GEOGRAPHIC SUMMARIES

THE PROVINCE OF BULACAN

PAULA CAROLINA MALAY [1]

The province of Bulacan is northeast of Manila Bay in Luzon, Philippines. It is located in approximately the same latitude as Guatemala and Honduras in Central America, and Aden and Yemen at the southern tip of the Arabian Peninsula. It has an area of 2,644 square kilometers.

The western half of the province lies on the Central Plain of Luzon. It is drained by the Angat and Pampanga River systems which flow towards the southwest into Manila Bay. The other half is composed of uplands which gradually increase in altitude towards the east. These uplands becomes the foothills of the western flank of a sector of the Sierra Madre, or Eastern Cordilleras. The highest elevation of 1,193 meters is Mt. Oriol (Oryod).

Except for a strip of forested mountain along the eastern boundary, Bulacan has a tropical savanna climate. It has two distinct seasons, wet from May to December and relatively dry the rest of the year. Precipitation is higher at more elevated locations, as in Ipo Junction, Norzagaray, but the pattern is similar to that in the plain, as in Malolos, as the following rainfall records show:

	Jan.	*Feb.*	*Mar.*	*Apr.*	*May*	*June*	*July*	*Aug.*
Ipo	1.34	0.89	0.97	2.63	10.66	19.15	25.64	25.48
Malolos ..	0.72	0.42	0.54	0.67	6.97	13.67	18.65	19.15

	Sept.	*Oct.*	*Nov.*	*Dec.*	*Annual*
Ipo	19.93	13.02	10.42	5.20	135.33
Malolos	11.52	7.30	8.00	2.04	89.65

Droughts are rare. Typhoons usually occur between June and September. The temperature is rather uniform throughout the year with a minimum of 19°C (66.2°F) in January and a maximum of 34°C (93.2°F) in April and May. Except in the cooler and drier months from December to February, humidity is high especially in the lowlands.

The soils vary from the fine sandy clay within the swampy areas on the southwest to the silt and clay loams of the central lowlands, and to the tighter clay soils of the northern part of the province. The foothills adjacent to the low country are of tuff and alluvial materials in the lower levels and conglomerates at the higher altitudes. In most cases, these uplands are covered with grass.

Agriculture is the chief economic activity with rice as the most important product. Of the 76,698 hectares devoted to crops in 1954, 74,220 hectares were planted to rice. The production of 2,375.500 cavans of palay averaged 32 cavans per hectare. This is higher than the Philippine average of 27.3 cavans per hectare in 1954. Ranking ninth in production among the rice-producing provinces during the same year, it had a rice self-sufficiency ratio of 122.2%. The Bigaa clay loam of the

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plain give the highest yields of 63.3 cavans of palay per hectare (1933). Ten pump irrigation systems service a total of 1,254 hectares.

Fishing is the second most important industry. River-fishing by means of indigenous gear is carried on extensively by fishermen for their subsistence, but it is fishpond culture of *bangus* (chanos-chanos) which is given more significance. Brackish areas unfit for agriculture are diked and converted into fishponds. With 17,052 hectares in 1954, Bulacan led all other provinces in fishpond acreage. Important fishpond municipalities are Bulacan, Hagonoy, Obando and Malolos. With easy access to Manila markets, the province is the source of a large segment of the fresh fish supply in the city.

In the hilly eastern part of the province are the mineral deposits. The Angat iron mines produce a low quality ore used mostly for manufacturing plowshares. In the years before World War II, the Ipo gold mines yielded an average of 67,330 tons of ore, but by 1939, the reserves had practically been exhausted. The hills contain limestone deposits. Excellent gravel and sand are found in the bed of the Angat River where it flows further into the plain. Aside from its use for irrigation, this river provides the metropolitan area of Manila with part of its water supply.

The Census of 1948 lists a population of 411,382 living in 24 municipalities. The people are mostly Tagalogs. Historically, the populated areas are along the riverbanks in the lowland. Four municipalities with populations of more than 30,000 are Malolos, the capital; San Miguel; Hagonoy and Baliwag. These larger settlements are at the junctions of rivers which until 50 years ago were the main arteries of travel. Today, good roads with regular bus service, telegraph and telephone lines provide easy transportation and communication.

REFERENCES

1. Alicante, *et al., Soil Survey of Bulacan Province,* Technical Bulletin 5, DANR, Bureau of Printing, Manila, 1939.
2. Coronas, Rev. Jose, *The Climate and Weather of the Philippines, 1903-18,* Manila, 1920.
3. Manalo, Eugenio B., "The Distribution of Rainfall in the Philippines", *Philippine Geographical Journal,* V. 4, No. 4.
4. *Area Handbook on the Philippines;* the University of Chicago, HRAF, Inc., 1956, Preliminary Ed., V. 4.
5. *Census Atlas of the Philippines, 1939,* Census of 1939, V. 5, Bureau of Printing, Manila, 1939.
6. *1948 Census of the Philippines,* Bureau of Census and Statistics, Manila, 1951.
7. *Handbook on Philippine Land Resources,* Bureau of Lands, Manila, 1954.
8. *Philippine Agricultural Statistics,* V. II, DANR, Bureau of Printing, Manila, 1956.

BOOK REVIEWS

THE MANURING OF SUGAR CANE, by J. D. Holiday. 211 pp. Prepared for the Centre d' 'Etude de 1'Azote (Geneva, Switzerland). The Netherhall Press, Great Britain.

The Centre d'Etude de 1'Azote is an organization of West European nitrogen producers. This book is the second of a series, of which the first was *Means of Increasing Rice Production*, dealing with problems of soil fertility and the use of fertilizers on the more important world crops.

The Manuring of Sugar Cane is an interesting and a timely publication. The author first gives a forty-page general treatment of (1) the principal cane-producing countries, areas of cane harvest and exports, (2) the sugar cane plant and its cultivation, (3) the nutrient requirements of cane, and (4) fertilizers and manures. This is followed by the main section, a 120-page regional treatment of cane production and field experiments wherein twenty-five countries and lesser areas are considered. Following this unit is a five-page summary in each of three languages (English, French and German). The concluding section is a twenty-one page bibliography, with the references grouped according to country or areas. The author has understandably devoted particular attention to the results of research in the English-speaking areas, especially the British West Indies, but he has also reviewed the literature of Latin America, Java, Formosa, and other producing regions.

This is a factual, rather than an interpretative treatment of the subject. The printing is superb, the maps and graphs are pleasant to use. The well-chosen pictures are clear and distinct, some of them reproduced in color. There are only two critisms, both minor. The illustrations are not numbered and the maps and graphs are without captions. Secondly, There has been no attempt to allocate space on the basis of importance of the producing area. For example, there are more pages devoted to Barbados than to Australia.

In the opinion of this revieweer, *The Manuring of Sugar Cane* is the best single book on the geography of cane sugar production. There is undoubtedly a better and a more complete treatment for each of the producing areas, but heretofore there has been no real attempt to treat the world's sugar production from a regional point of view in a single publication. It is most unfortunate that this book is not readily available to geographers, agronomists, economists, planters, central managers, sugar technologists and all others interested in the sugar industry.

ALDEN CUTSHALL

REHABILITATION FINANCE CORPORATION, ANNUAL REPORT 1956, submitted by RFC Chairman Eduardo Z. Romualdez to the President of the Republic of the Philippines, printed in Manila, Bureau of Printing, 1956, 60 pages, 2 diagrams, 5 graphs, 4 tables.

The Rehabilitation Finance Corporation, in undertaking an active part in the general development of the country, reports that the total loans for 1955-1956 soared to ₱81,369,691.83 from the total loans of ₱36,479,570.50 given out the preceding year. These amounts were used in the production of products usually imported and such products in great demand at present like citrus, abaca, coffee, livestock, rice, onion, cacao, kenaf, tobacco, corn and sugar. The development of the country's fishponds, idle agricultural lands and banks, orchards, livestock industry and dairy cottage industries was made possible through the implementation of the Special Financing Plans of the RFC.

During the fical year 1955-56, 6,910 loans were approved. This sets a margin of 616 loans over that of 1954-1955, during which year 6,294 loans were approved. These figures show that there has been an increase of 9.78% in individuals and entities who applied for loans and 6.39% in funds released. 32.67% of the total loans, worth ₱26,585,246.83 was used for agricultural purposes; 33.37% for real estate; 6.95% for government loans and public improvements; 0.60% for purchase of landed estates and 1.99% for rural banks' capital stock.

In 1954-1955, ₱23,790,295.00 was approved for industrial loans while last year, only ₱19,872,820.00 was approved, showing that there was greater need for industrial development in the country in the year 1954-1955. Last year's agricultural loan, amounting to ₱26,585,246.83 shows that we had a more extensive development program. In the year 1954-1955, only ₱20,670,475.50 was expended for agricultural development. Only trust funds were given out as real estate loans during FY 1955-1956. This amounted to ₱27,154,458. In 1954-1955, ₱2,406,200.00 of the corporation fund and ₱24,695,000.00 of trust funds were expended for real estate.

There has been an increase of over a million pesos in the government loans approved during the last fiscal year. ₱5,656,200.00 was borrowed by the Philippine government. In the year 1954-1955, ₱4,014,900 was given out as loan to the government. Loans on landed estates for the last two years have a little difference. In 1955-1956, ₱485,000.00 was expended for this purpose. In 1954-1955, this totalled only to ₱431,000.00. Subscription to capital stock of rural banks showed a remarkable increase last year, for ₱1,615,975.00 was approved. Only ₱471,700 was subscribed to the capital stock of rural banks the preceding year.

At a glance, we see that the industrial and agricultural development of the country was expedited last year. Today, there are more factories, more homes, more agricultural lands developed and more crops available in the market. Year after year, the number and amount of these will increase steadily for as long as the RFC exists in harmony with the development interests of the country.

CELINE SINGSON

LAND, MAN, AND CULTURE IN MAINLAND SOUTHEAST ASIA—By William L. Thomas, Jr., A dissertation presented to the Faculty of the Graduate School of Yale University in Candidacy for the Degree of Doctor of Philosophy, 1955. Privately published by the Author, Glen Rock, New Jersey, 1957, 197 pages.

This book is a study of the significance of the concept of culture for geographic thought, based upon an analysis of the writings on the human geography of mainland Southeast Asia by American, British, German, and French scholars. It contains 8 chapters divided into Part One with 2 chapters, Part Two with 3 chapters, Part Three with 2 chapters and Part Four with 1 chapter and Bibliography.

This is really an interesting book containing ideas and concepts on geographic thought from writings of 348 books written by American, British, German and French authors.

In the Introduction, the author set forth the systematic setting in the First Chapter and then enumerated in the Second Chapter the works of anthropologists in the mainland Southeast Asia. In Part Two, the author explored the concept of culture in theory and practice of the different authors who have written, studied and published their books on the mainland Southeast Asia. The author has delved mainly on what have been published by the numerous authors who have written these books since as early as 1865, by E. B. Tylor on the Researches into the Early History of Mankind and the Development of Civilization. This book of Tylor was published in Boston in 1878 and in London in 1865.

The list of authors of these books on the Bibliography is considered wealth of references any geographer could refer to for information on the geography of mainland Southeast Asia. Contemporary authors like Joseph E. Spencer, Dr. E. H. G. Dobby, Wilhelm Credner and Pierre Gourou were among the authors on the list of Bibliography.

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GEOGRAPHY BOOKS

The following geography books are available at the Philippine Education Co., Inc. 1104 Castillejos, Manila for the students and professionals in geography. The Journal will be glad to furnish anybody who wishes to ask information in this regard.

College:

New College Geopraphy — Peattie	P10.00
Elements of Political Geography, 2nd Ed. — Van Vallenbourg & Stotz	17.85
Principles of Human Geography, 6th Ed. — Huntington & Shaw	20.25
Fundamentals of Economic Geography, 3rd Ed. — Bengtson & Van Royen	18.20
Economic Geography — Dicken	16.90

High School:

The American Nations — Atwood & Thomas	9.60
Living Together in the Old World — Cutright, Charters & Lefferts	9.70
Our Earth — Whipple & James	6.05
Geography of the Americas — McConnell	9.85
The American Continents — Barrows, Parker & Sorensen	10.20
A World View — Sorensen	11.10

Elementary:

Geography Around the World — McConnell	8.35
Your Town and Mine — Tiegs, Adams & Thomas	7.75
Geography of Many Lands — McConnell & McGuigan	8.50
Introduction to Global Geography: How to Study Maps & Globes — Baxter & Stevens	6.40
Home Folks — Smith	5.85
Our Big world — Barrows, Parker & Sorensen	8.10
Our Earth and Men — Whipple & James	11.30
Your Country & Mine —Tiegs, Adams and Brown	11.00
The United States in the Modern World — McConnell	11.30
Your World and Mine — Dawson	9.95
Your People and Mine — Mackenzie	8.30
Your Country and the World — Glendinning, Tiegs & Adams	12.30
World at Work — Atwood	10.80
Old World Lands — Barrows, Parker & Sorensen	9.95
Life in America — The Northeast — Havighurst	9.20
Mexico — Holmes	7.20
Growth of Nations — Atwood & Thomas	11.35
Europe — Carpenter's New Geographical Reader	4.65
Australia & New Zealand — Irwin & Irwin	8.80
Great Britain & Canada — Russell	8.80
Home Lands — Miller, Ty & Balagot	6.05
How We and Our Neighbors Live — Galang & Maceda	7.70
Your Country and Mine — Ty, Garcia & Maceda	6.60
One World — Old and New — Grade VI — Agoncillo	4.80
The Pacific — Islands & Peoples — Carpenter	6.50
American Continents — Barrows, Parker & Sorensen	11.15

GEOGRAPHICAL NEWS

AMERICAN GEOGRAPHERS VISIT PHILIPPINES

Three well known American geographers showed up in the office of the president of the Philippine Geographical Society to discuss matters of geographical nature.

They were Dr. Alden Cutshall of the University of Illinois, Chicago Division, Dr. Joseph E. Spence of the University of California at Los Angeles and Mr. Edward B. Espenshade, Jr. of the Department of Geography of Northwestern University in Evanston, Illinois.

Dr. Spencer, who hails from Los Angeles, U.S.A., is here for a short stop. He is on his way to the University of Malaya to give lectures on geography in that University. He wrote Land and People in the Philippines (1952), Asia-East by South (1954) and many articles. At present, he is in Northern Mindanao making notes on the shifting cultivation in the Philippines.

Dr. Cutshall is now at the University of the Philippines as Fulbright Professor of Geography. He is again giving some of his time to the Philippine Geographical Society during his stay here in the Philippines.

Mr. Espenshade, Jr. visited the Philippine Geographical Society offices with Dr. Cutshall last July 19, 1957. He was on his way to Malaya and the Southeast Asian countries. A trip was made for the visitors to the Lake towns of Rizal. They observed the soil formations in Marikina, Antipolo, Teresa, and Pililla. Irrigation pump projects at Quisao, Pililla were also visited by the group.

100TH MEMBER JOINS GEOGRAPHICAL SOCIETY

The Philippine Geographical Society, an exclusive organization of geography enthusiasts, records its 100th member in the person of Miss Ellen Paglinauan, 18 years old, of Albay, Albay. Miss Paglinauan is a junior student in the Philippine studies curriculum at the University of the Philippines. She is the youngest member of the society which had its beginnings in December 8, 1950 with 21 members. The increase in membership shows that geography in the Philippines is being given significant recognition.

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